Section 1.1

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"It is not that I'm so smart. But I stay with the questions much longer."

- Albert Einstein

Here are two possible explanations for why Harley chose the correct cup 9 out of 10 times:

- He was just guessing and got lucky in these 10 trials.
- He is doing something other than merely guessing and perhaps understands what the experimenter means when they bow towards the cup.

(1) According to the simulated "chance model", which is the more plausible (more likely to be correct) explanation?

A He is just guessing.

B There is something more than guessing happening here.

C Both explanations are equally plausible.

D Neither explanation is plausible.

(2) After determining that 9 out of 10 correct cup choices with human gestures was statistically significant, the researchers used a mechanical arm to point and Harley got 6 out of 10 correct. Was this second result statistically significant?

A Yes, and I'm very confident.

B Yes, but I'm not sure.

C No, but I'm not sure.

D No, and I'm very confident.

(3) What is the parameter of interest in Exploration 1.1?

A The 10 trials

B The proportion of times Harley chooses the correct cup in 10 trials

C The long-run probability that Harley will choose the correct cup over many, many trials

D The number of times Harley chooses the correct cup

(4) Why do we select 0.50 as being the hypothesized value (`Probability of heads`)?

A The chance model for One Proportion tests will be 0.50 regardless of the situation.

B This hypothesized value corresponds to the chance outcome of flipping a fair coin and getting a head.

C This is actually an error. We should have selected 0.90 since that is the proportion of the time Harley was correct.

D We could have picked any value between 0 and 1 and we just happened to pick 0.5.

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- We introduce *chance models*, which help us determine if study results are statistically significant.

Doris and Buzz

- Can dolphins communicate abstract ideas?
- In an experiment done in the 1960s, Doris was instructed which of two buttons to push. She then had to communicate this to Buzz (who could not see Doris). If he picked the correct button, both dolphins would get a fish as a reward.

For one trial:

- Dr. Bastian would show the light (blinking or steady) to Doris.
- Doris would swim over towards Buzz and the dolphins would exchange squeaks.
- Buzz would select one of the two buttons.
- If Buzz selected the correct button, both dolphins got a fish.

(5) Dr. Bastian repeated this trial 16 times and Buzz selected the correct button in 15 out of 16 trials. What are the observational units?

A Buzz and Doris.

B Doctors.

C Dolphins.

D The trials.

(6) What is the variable of interest? **Hint:** the variable of interest must be a characteristic of the observational units.

A The number of times Buzz pushed the correct button.

B The status of the light (steady or blinking).

C Whether or not Buzz pushed the correct button.

D If Doris and Buzz did better than guessing.

E The two different dolphins.

Statistic: Compute a statistic from the study (15 out of 16 correct).

Simulate: Identify a model that represents a chance explanation. Repeatedly simulate values of the statistic that could have happened when the chance model is true and form a distribution (coin flipping applet).


Number of successes

Strength of Evidence: Consider whether the value of the observed statistic is unlikely to occur when the chance model is true (we never got 15 out of 16).

(7) With a wooden barrier replacing the canvas barrier, Buzz pushed the correct button 16 out of 28 times. Use the one Proportion applet to decide if this result is statistically significant.

A No

B Probably not

C I am unsure

D Probably

E Yes

This time, the study statistic, 16 out of 28 correct, happens 28 or 29% of the time, when Buzz is just guessing, which is NOT statistically significant.

Number of successes
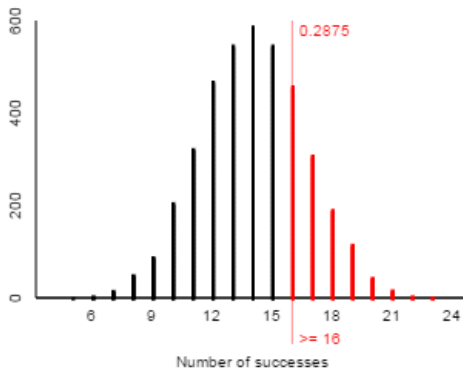
- Test of Significance
- Hypotheses
    - Null Hypothesis, H_0
    - Alternative Hypothesis, H_a

- Parameter versus Statistic

- Binary Variable

- p-value